

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended): A valve operating apparatus for an internal combustion engine including:

- a housing [(2)];
- a reciprocating piston [(1)] residing wholly within the housing [(2)], the reciprocating piston [(1)] driving one or more poppet valves [(7)];
- a first fluid supply path [(3)] and a first fluid drain path [(5)], each path being controllable to supply or drain fluid to/from a first reciprocating piston end [(16)];
- a second fluid supply path [(4)] and a second fluid drain path [(6)], each path being controllable to supply or drain fluid to/from a second reciprocating piston end [(17)];

wherein said reciprocating piston [(1)], in use, is driven between a first position and a second position by controlling said fluid in said supply and drain paths [(3, 4, 5, 6)], thereby operating said one or more poppet valves [(7)], and wherein ~~characterised in that~~ a connector [(9)] passes through an aperture [(14)] in said housing [(2)] to connect said reciprocating piston [(1)] to said one or more poppet valves [(7)], said reciprocating piston [(1)] in co-operation with an internal wall of the housing forming a seal to prevent substantial egress of fluid through said aperture [(14)] from the first reciprocating piston end [(16)] and from the second reciprocating piston end [(17)].

2. (currently amended): A valve operating apparatus according to claim 1 wherein ~~characterised in that~~ said aperture [(14)] is substantially sealed by at least a portion of the external surface of said reciprocating piston [(1)] to prevent egress of fluid from the housing [(2)] through said aperture [(14)].

3. (currently amended): A valve operating apparatus according to claim 1 wherein ~~any one of the preceding claims characterised in that~~ said aperture [(14)] is located in a side wall of said housing [(2)], and wherein an external side wall surface of said piston [(1)] in conjunction with an internal side wall surface of said housing forms said seal to prevent substantial egress of fluid from the housing [(2)] through said aperture [(14)].

4. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that the longitudinal axis of said connector ~~[[9]]~~ is substantially perpendicular to the longitudinal axis of said piston ~~[[1]]~~.

5. (currently amended): A valve operating apparatus according to claim 1 wherein the any one of the preceding claims characterised in that a connector ~~rod~~ ~~[[9]]~~ is a rod fixed to the reciprocating piston ~~[[1]]~~ and connects to said one or more poppet valves ~~[[7]]~~.

6. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that said first reciprocating piston end ~~[[16]]~~ and said second reciprocating piston end ~~[[17]]~~ have substantially the same surface area.

7. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that each of said first fluid supply path ~~[[3]]~~, first fluid drain path ~~[[5]]~~, second fluid supply path ~~[[4]]~~ and second fluid drain path ~~[[6]]~~ has an independently operable control valve ~~[[24]]~~, said control valve ~~[[24]]~~ operable to have a closed, partially open or open state, operation of the four said control valves ~~[[24]]~~ regulating the flow of fluid to said first and second reciprocating piston ends ~~[[16, 17]]~~, thus enabling control of the movement of the reciprocating piston ~~[[1]]~~ and hence operation of the one or more poppet valves ~~[[7]]~~.

8. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that a reservoir of high pressure fluid ~~[[22]]~~ is in fluid connection with one or more of said fluid supply paths ~~[[3, 4, 5, 6]]~~.

9. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that fluid in said supply and drain paths ~~[[3, 4, 5, 6]]~~ is controlled by an engine management system controller ~~[[19]]~~, said engine management system controller ~~[[19]]~~ controlling the operation of the reciprocating piston ~~[[1]]~~ and thus enabling variable lift and variable timing control of said one or more poppet valves ~~[[7]]~~.

10. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that said reciprocating piston $[(1)]$ may be decelerated by controlling said fluid in said supply and drain paths $[(3, 4, 5, 6)]$ to avoid crashing of said one or more poppet valves $[(7)]$ onto their respective seats.

11. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that said reciprocating piston $[(1)]$ is biased $[(12)]$ when in an inoperative state to a predetermined position, thereby biasing each said poppet valve $[(7)]$ to a predetermined position and the biasing means $[(12)]$ being prevented from acting on the reciprocating piston $[(1)]$ when said reciprocating piston $[(1)]$ is in an operative state.

12. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that said reciprocating piston $[(1)]$ is partially hollow, said hollow $[(18)]$ providing a surface upon which vertical force may act at least at one end $[(16, 17)]$ of said reciprocating piston $[(1)]$.

13. (currently amended): A valve operating apparatus according to claim 1 wherein any one of the preceding claims characterised in that said connector $[(9)]$ connecting the reciprocating piston $[(1)]$ to the one or more poppet valves $[(7)]$ allows each poppet valve $[(7)]$ to spin about its longitudinal axis.

14. (currently amended): An engine including a valve operating apparatus according to claim 1 any one of the preceding claims.

15. (currently amended): A motor vehicle including a valve operating apparatus according to claim 1 any one of the preceding claims.

16. (new): A valve operating apparatus according to claim 2 wherein:

- said aperture $[(14)]$ is located in a side wall of said housing $[(2)]$, and wherein an external side wall surface of said piston $[(1)]$ in conjunction with an internal side

wall surface of said housing forms said seal to prevent substantial egress of fluid from the housing [(2)] through said aperture [(14)]; and

- said connector [(9)] is a rod fixed to the reciprocating piston [(1)] and connects to said one or more poppet valves [(7)]; and
- fluid in said supply and drain paths [(3, 4, 5, 6)] is controlled by an engine management system controller [(19)], said engine management system controller [(19)] controlling the operation of the reciprocating piston [(1)] and thus enabling variable lift and variable timing control of said one or more poppet valves [(7)].

17. (new): A valve operating apparatus according to claim 16 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

18. (new): A valve operating apparatus according to claim 16 wherein each of said first fluid supply path [(3)], first fluid drain path [(5)], second fluid supply path [(4)] and second fluid drain path [(6)] has an independently operable control valve [(24)], said control valve [(24)] operable to have a closed, partially open or open state, operation of the four said control valves [(24)] regulating the flow of fluid to said first and second reciprocating piston ends [(16, 17)], thus enabling control of the movement of the reciprocating piston [(1)] and hence operation of the one or more poppet valves [(7)].

19. (new): A valve operating apparatus according to claim 18 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

20. (new): A valve operating apparatus according to claim 16 wherein said first reciprocating piston end [(16)] and said second reciprocating piston end [(17)] have substantially the same surface area.

21. (new): A valve operating apparatus according to claim 20 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

22. (new): A valve operating apparatus according to claim 20 wherein each of said first fluid supply path [(3)], first fluid drain path [(5)], second fluid supply path [(4)] and second fluid drain path [(6)] has an independently operable control valve [(24)], said control valve [(24)] operable to have a closed, partially open or open state, operation of the four said control valves [(24)] regulating the flow of fluid to said first and second reciprocating piston ends [(16, 17)], thus enabling control of the movement of the reciprocating piston [(1)] and hence operation of the one or more poppet valves [(7)].

23. (new): A valve operating apparatus according to claim 22 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

24. (new): A valve operating apparatus according to claim 16 wherein said reciprocating piston [(1)] may be decelerated by controlling said fluid in said supply and drain paths [(3, 4, 5, 6)] to avoid crashing of said one or more poppet valves [(7)] onto their respective seats.

25. (new): A valve operating apparatus according to claim 24 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

26. (new): A valve operating apparatus according to claim 24 wherein each of said first fluid supply path [(3)], first fluid drain path [(5)], second fluid supply path [(4)] and second fluid drain path [(6)] has an independently operable control valve [(24)], said control valve [(24)] operable to have a closed, partially open or open state, operation of the four said control valves [(24)] regulating the flow of fluid to said first and second reciprocating piston ends [(16, 17)], thus enabling control of the movement of the reciprocating piston [(1)] and hence operation of the one or more poppet valves [(7)].

27. (new): A valve operating apparatus according to claim 26 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

28. (new): A valve operating apparatus according to claim 24 wherein said first reciprocating piston end [(16)] and said second reciprocating piston end [(17)] have substantially the same surface area.

29. (new): A valve operating apparatus according to claim 28 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].

30. (new): A valve operating apparatus according to claim 28 wherein each of said first fluid supply path [(3)], first fluid drain path [(5)], second fluid supply path [(4)] and second fluid drain path [(6)] has an independently operable control valve [(24)], said control valve [(24)] operable to have a closed, partially open or open state, operation of the four said control valves [(24)] regulating the flow of fluid to said first and second reciprocating piston ends [(16, 17)], thus enabling control of the movement of the reciprocating piston [(1)] and hence operation of the one or more poppet valves [(7)].

31. (new): A valve operating apparatus according to claim 30 wherein said reciprocating piston [(1)] is partially hollow, said hollow [(18)] providing a surface upon which vertical force may act at least at one end [(16, 17)] of said reciprocating piston [(1)].